Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

Age-related changes in health. In: Evidence-based geriatric nursing protocols for best practice.

Bibliographic Source(s)

Smith CM, Cotter V. Age-related changes in health. In: Boltz M, Capezuti E, Fulmer T, Zwicker D, editor(s). Evidence-based geriatric nursing protocols for best practice. 4th ed. New York (NY): Springer Publishing Company; 2012. p. 23-47.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Smith CM, Cotter V. Age-related changes in health. In: Capezuti E, Zwicker D, Mezey M, Fulmer T, editor(s). Evidence-based geriatric nursing protocols for best practice. 3rd ed. New York (NY): Springer Publishing Company; 2008. p. 431-58.

Recommendations

Major Recommendations

Levels of evidence (I–VI) are defined at the end of the "Major Recommendations" field.

Age-associated Cardiovascular Changes

Definition

Isolated systolic hypertension: systolic blood pressure (BP) >140 mmHg and diastolic BP <90 mmHg.

Etiology

- Arterial wall thickening and stiffening, decreased compliance
- Left ventricular and atrial hypertrophy. Sclerosis of atrial and mitral valves
- Strong arterial pulses, diminished peripheral pulses, cool extremities

Parameters of Cardiovascular Assessment

- Cardiac assessment: electrocardiogram (ECG); heart rate, rhythm, murmurs, heart sounds (S_4 common, S_3 in disease). Palpate carotid artery and peripheral pulses for symmetry (Docherty, 2002 [Level I])
- Assess BP (lying, sitting, standing) and pulse pressure (Mukai & Lipsitz, 2002 [Level VI]).

Age-associated Changes in the Pulmonary System

Etiology

- Decreased respiratory muscle strength; stiffer chest wall with reduced compliance
- Diminished ciliary and macrophage activity, drier mucus membranes. Decreased cough reflex
- Decreased response to hypoxia and hypercapnia

Parameters of Pulmonary Assessment

- Assess respiration rate, rhythm, regularity, volume, depth (Docherty, 2002 [Level I]), and exercise capacity (Mahler, Fierro-Carrion, & Baird, 2003 [Level V]). Auscultate breath sounds throughout lung fields (Mick & Ackerman, 2004 [Level V]).
- Inspect thorax appearance, symmetry of chest expansion. Obtain smoking history.
- Monitor secretions, breathing rate during sedation, positioning (Watters, 2002 [Level V]; Docherty, 2002 [Level I]) arterial blood gases, pulse oximetry (Zeleznik, 2003 [Level V]).
- Assess cough, need for suctioning (Smith & Connolly, 2003 [Level V]).

Nursing Care Strategies

- Maintain patent airways through upright positioning/repositioning (Docherty, 2002 [Level I]), suctioning (Smith & Connolly, 2003 [Level V]).
- Provide oxygen as needed (Docherty, 2002 [Level I]); maintain hydration and mobility (Watters, 2002 [Level V]).
- Incentive spirometry as indicated, particularly if immobile or declining in function (Dunn, 2004 [Level V]).
- Education on cough enhancement (Dunn, 2004 [Level V]), smoking cessation (U.S. Department of Health and Human Services [USDHHS], "The Health Consequences," 2004 [Level I]).

Age-associated Changes in the Renal and Genitourinary Systems

Definitions

To determine renal function (glomerular filtration rate [GFR]):

Cockroft-Gault Equation: Calculation of creatinine clearance in older adults (Péquignot et al., 2009 [Level II]):

For Men:

Creatinine clearance (mL/min) =

$$\frac{(140 - \text{age in years}) \times (\text{body weight in kg})}{72 \times (\text{serum creatinine, mg/dL})}$$

For Women: the calculated value is multiplied by 85% (0.85).

Modification of diet in renal disease (MDRD): see National Kidney Disease Education Program calculator (National Kidney Disease Education Program [NKDEP], 2009 [Level I]).

Etiology

- Decreases in kidney mass, blood flow, GFR (10% decrement/decade after age 30). Decreased drug clearance.
- Reduced bladder elasticity, muscle tone, capacity.
- Increased post-void residual, nocturnal urine production.
- In males, prostate enlargement with risk of benign prostatic hyperplasia (BPH).

Parameters of Renal and Genitourinary Assessment

- Assess renal function (GFR through creatinine clearance) (Lerma, 2009 [Level V]; Miller, 2009 [Level V]; NKDEP, 2009 [Level I]; Péquignot et al., 2009 [Level II]).
- Assess choice/need/dose of nephrotoxic agents and renally cleared drugs (Beyth & Shorr, 2002 [Level V]) (see the National Guideline Clearinghouse [NGC] summary of the Hartford Institute for Geriatric Nursing guideline Reducing adverse drug events in older adults).
- Assess for fluid/electrolyte and acid/base imbalances (Suhayda & Walton, 2002 [Level V]).
- Evaluate nocturnal polyuria, urinary incontinence, BPH (Miller, 2009 [Level V]). Assess urinary tract infection (UTI) symptoms (see the

"Atypical Presentation of Disease" section, below) (Htwe et al., 2007 [Level V]).
- Assess fall risk if nocturnal or urgent voiding (see the NGC summary of the Hartford Institute for Geriatric Nursing guideline Fall prevention).

Nursing Care Strategies

- Monitor nephrotoxic and renally cleared drug levels (Beyth & Shorr, 2002 [Level V]).
- Maintain fluid/electrolyte balance. Minimum 1,500 to 2,500 mL/day from fluids and foods for 50- to 80-kg adults to prevent dehydration (Suhayda & Walton, 2002 [Level V]).
- For nocturnal polyuria: limit fluids in evening, avoid caffeine, use prompted voiding schedule (Miller, 2009 [Level V]).
- Fall prevention for nocturnal or urgent voiding. (See the NGC summary of the Hartford Institute for Geriatric Nursing guideline Fall Prevention).

Age-associated Changes in the Oropharyngeal and Gastrointestinal Systems

Definition(s)

Body mass index (BMI): Healthy, 18.5 to 24.9 kg/m^2; overweight, 25 to 29.9 kg/m^2; obesity, 30 kg/m^2 or greater.

Etiology

- Decreases in strength of muscles of mastication, taste, and thirst perception.
- Decreased gastric motility with delayed emptying.
- Atrophy of protective mucosa.
- Malabsorption of carbohydrates, vitamins B_{12} and D, folic acid, calcium.
- Impaired sensation to defecate.
- Reduced hepatic reserve. Decreased metabolism of drugs.

Parameters of Oropharyngeal and Gastrointestinal Assessment

- Assess abdomen, bowel sounds.
- Assess oral cavity (see the NGC summary of the Hartford Institute for Geriatric Nursing guideline Providing oral health care to older adults), chewing and swallowing capacity, dysphagia (coughing, choking with food/fluid intake) (Ney et al., 2009 [Level V]). If aspiration, assess lungs (rales) for infection and typical/atypical symptoms (Bartlett et al., 2000 [Level I]; High, 2009 [Level V]) (see the "Atypical Presentation of Disease" section, below).
- Monitor weight, calculate BMI, compare to standards (American Heart Association Nutrition Committee et al., 2006 [Level I]). Determine dietary intake, compare to nutritional guidelines (Chapman, 2007 [Level V]; USDHHS, 2005 [Level I]; Visvanathan & Chapman, 2009 [Level V]) (see the NGC summary of the Hartford Institute for Geriatric Nursing guideline Nutrition in aging).
- Assess for gastroesophageal reflux disease (GERD), constipation and fecal incontinence; fecal impaction by digital examination of rectum or palpation of abdomen.

Nursing Care Strategies

- Monitor drug levels and liver function tests if on medications metabolized by liver. Assess nutritional indicators (Chapman, 2007 [Level V]; USDHHS, 2005 [Level I]; Visvanathan & Chapman, 2009 [Level V]).
- Educate on lifestyle modifications and over-the-counter (OTC) medications for GERD.
- Educate on normal bowel frequency, diet, exercise, recommended laxatives. Encourage mobility, provide laxatives if on constipating medications (Stern, 2006 [Level V]).
- Encourage participation in community-based nutrition programs (Visvanathan & Chapman, 2009 [Level V]); educate on healthful diets (USDHHS, 2005 [Level I]).

Age-associated Changes in the Musculoskeletal System

Definition

Sarcopenia: Decline in muscle mass and strength associated with aging.

Etiology

- Sarcopenia evokes increased weakness and poor exercise tolerance.
- Lean body mass replaced by fat with redistribution of fat.
- Bone loss in women and men after peak mass at age 30 to 35 years.
- Decreased ligament and tendon strength. Intervertebral disc degeneration. Articular cartilage erosion. Changes in stature with kyphosis, height reduction.

Nursing Care Strategies

- Encourage physical activity through health education and goal setting (Conn et al., 2003 [Level I]) to maintain function (Netz et al., 2005 [Level I]).
- Pain medication to enhance functionality (see the NGC summary of the Hartford Institute for Geriatric Nursing guideline Pain management in older adults). Implement strategies to prevent falls (see the NGC summaries of the Hartford Institute for Geriatric Nursing guidelines Fall prevention and Physical restraints and side rails in acute and critical care settings).
- Prevent osteoporosis by adequate daily intake of calcium and vitamin D, physical exercise, smoking cessation (USDHHS, "Bone Health," 2004 [Level I]). Advise routine bone mineral density screening (Agency for Healthcare Research and Quality, 2010 [Level I]).

Age-associated Changes in the Nervous System and Cognition

Etiology

- Decrease in neurons and neurotransmitters.
- Modifications in cerebral dendrites, glial support cells, synapses.
- Compromised thermoregulation.

Parameters of Nervous System and Cognition Assessments

- Assess, with periodic reassessment, baseline functional status (Craft, Cholerton, & Reger, 2009 [Level V]) (see the NGC summaries of the Hartford Institute for Geriatric Nursing guidelines Assessment of physical function and Fall Prevention). During acute illness, monitor functional status and delirium (see the NGC summary of the Hartford Institute for Geriatric Nursing guideline Delirium).
- Evaluate, with periodic reassessment, baseline cognition (see the NGC summary of the Hartford Institute for Geriatric Nursing guideline Assessing Cognitive Functioning), and sleep disorders (Espiritu, 2008 [Level V]). (See the NGC summary of the Hartford Institute for Geriatric Nursing guideline Excessive sleepiness).
- Assess impact of age-related changes on level of safety and attentiveness in daily tasks (Park, O'Connell, & Thomson, 2003 [Level I]; Henry et al., 2004 [Level I]).
- Assess temperature during illness or surgery (Kuchel, 2009 [Level V]).

Nursing Care Strategies

- Institute fall preventions strategies (see the NGC summary of the Hartford Institute for Geriatric Nursing guideline Fall prevention).
- To maintain cognitive function, encourage lifestyle practices of regular physical exercise (Colcombe & Kramer, 2003 [Level I]), intellectual stimulation (Mattson, 2009 [Level V]), and healthful diet (Joint National Committee, 2004 [Level I]).
- Recommend behavioral interventions for sleep disorders.

Age-associated Changes in the Immune System

Etiology

- Immune response dysfunction (Kuchel, 2009 [Level V]) with increased susceptibility to infection, reduced efficacy of vaccination (Htwe et al., 2007 [Level V]), chronic inflammatory state (Hunt et al., 2010 [Level V]).

Nursing Care Strategies

- Follow the Centers for Disease Control and Prevention (CDC) immunization recommendations for pneumococcal infections, seasonal influenza, zoster, tetanus, and hepatitis for the older adult (CDC, 2010 [Level I]; High, 2009 [Level V]).

Atypical Presentation of Disease

Etiology

- Diseases, especially infections, may manifest with atypical symptoms in older adults.

- Symptoms/signs (often subtle) include nonspecific declines in function or mental status, decreased appetite, incontinence, falls (Htwe et al., 2007 [Level V]), fatigue (Hall, 2002 [Level V]), exacerbation of chronic illness (High, 2009 [Level V]).
- Fever blunted or absent in very old (High, 2009 [Level V]), frail, or malnourished (Watters, 2002 [Level V]) adults. Baseline oral temperature in older adults is 97.4°F (36.3°C) versus 98.6°F (37°C) in younger adults (Lu, Leasure, & Dai, 2010 [Level I]).

Parameters of Disease Assessment

- Note any change from baseline in function, mental status, behavior, appetite, chronic illness (High, 2009 [Level V]).
- Assess fever. Determine baseline and monitor for changes 2 to 2.4°F (1.1–1.3°C) above baseline (Htwe et al., 2007 [Level V]). Oral temperatures above 99°F (37.2°C) or greater also indicate fever (High, 2009 [Level V]).
- Note typical and atypical symptoms of pneumococcal pneumonia (Bartlett et al., 2000 [Level I]; Htwe et al., 2007 [Level V]; Imperato & Sanchez, 2006 [Level V]), tuberculosis (Kuchel, 2009 [Level V]), influenza (Htwe et al., 2007 [Level V]), UTI (Htwe et al., 2007 [Level V]), peritonitis (Hall, 2002 [Level V]), and GERD (Hall, 2009 [Level V]).

Follow-up Monitoring of Condition

- Continue to reassess effectiveness of interventions.
- Incorporate continuous quality improvement criteria into existing programs.

Definitions:

Levels of Evidence

Level I: Systematic reviews (integrative/meta-analyses/clinical practice guidelines based on systematic reviews)

Level II: Single experimental study (randomized controlled trials [RCTs])

Level III: Quasi-experimental studies

Level IV: Non-experimental studies

Level V: Care report/program evaluation/narrative literature reviews

Level VI: Opinions of respected authorities/consensus panels

AGREE Next Steps Consortium (2009). Appraisal of guidelines for research & evaluation II. Retrieved from http://www.agreetrust.org/?o=1397 .

Adapted from: Melnyck, B. M. & Fineout-Overholt, E. (2005). Evidence-based practice in nursing & health care: A guide to best practice. Philadelphia, PA: Lippincott Williams & Wilkins and Stetler, C.B., Morsi, D., Rucki, S., Broughton, S., Corrigan, B., Fitzgerald, J., et al. (1998). Utilization-focused integrative reviews in a nursing service. Applied Nursing Research, 11(4) 195-206.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Age-related changes that adversely affect health and functionality

Guideline Category

Evaluation

Management

Prevention

Risk Assessment

Clinical Specialty

Family Practice

Geriatrics

Nursing

Preventive Medicine

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Health Care Providers

Hospitals

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To provide a standard of practice protocol to identify anatomical and physiological changes which are attributed to the normal aging process

Target Population

Older adults

Interventions and Practices Considered

Assessment/Evaluation

1. Cardiovascular system
2. Pulmonary system
3. Renal and genitourinary systems
4. Oropharyngeal and gastrointestinal systems
5. Musculoskeletal system
6. Nervous system and cognition
7. Immune system
8. Atypical presentation of disease

Management

1. Management of changes that adversely affect health and functionality:
    - Cardiovascular system: decreased cardiac reserve and associated implications

- Pulmonary system: decreased pulmonary functional reserve, ciliary and macrophage activity, cough reflex, response to hypoxia and hypercapnia, and associated implications
- Genitourinary system: decreased renal functional reserve, risk of nephrotoxic injury, and associated implications; urinary urgency, incontinence
- Oropharyngeal and gastrointestinal systems: poor nutrition, gastric changes, constipation, fecal incontinence, and associated implications
- Musculoskeletal system: sarcopenia, osteopenia, osteoporosis, and associated implications
- Nervous system and cognition: decreased muscle strength, temperature sensitivity, cognitive processing speed, and associated implications; sleep disorders, delirium, neurodegenerative disorders
- Immune system: immune response dysfunction

2. Follow-up monitoring

Major Outcomes Considered

Successful aging

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Although the Appraisal of Guidelines for Research and Evaluation (AGREE) instrument (described in Chapter 1 of the original guideline document, *Evidence-based Geriatric Nursing Protocols for Best Practice*, 4th ed.) was created to critically appraise clinical practice guidelines, the process and criteria can also be applied to the development and evaluation of clinical practice protocols. Thus, the AGREE instrument has been expanded (i.e., AGREE II) for that purpose to standardize the creation and revision of the geriatric nursing practice guidelines.

The Search for Evidence Process

Locating the best evidence in the published research is dependent on framing a focused, searchable clinical question. The PICO format—an acronym for population, intervention (or occurrence or risk factor), comparison (or control), and outcome—can frame an effective literature search. The editors enlisted the assistance of the New York University Health Sciences librarian to ensure a standardized and efficient approach to collecting evidence on clinical topics. A literature search was conducted to find the best available evidence for each clinical question addressed. The results were rated for level of evidence and sent to the respective chapter author(s) to provide possible substantiation for the nursing practice protocol being developed.

In addition to rating each literature citation as to its level of evidence, each citation was given a general classification, coded as "Risks," "Assessment," "Prevention," "Management," "Evaluation/Follow-up," or "Comprehensive." The citations were organized in a searchable database for later retrieval and output to chapter authors. All authors had to review the evidence and decide on its quality and relevance for inclusion in their chapter or protocol. They had the option, of course, to reject or not use the evidence provided as a result of the search or to dispute the applied level of evidence.

Developing a Search Strategy

Development of a search strategy to capture best evidence begins with database selection and translation of search terms into the controlled vocabulary of the database, if possible. In descending order of importance, the three major databases for finding the best primary evidence for most clinical nursing questions are the Cochrane Database of Systematic Reviews, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Medline or PubMed. In addition, the PsycINFO database was used to ensure capture of relevant evidence in the psychology and

behavioral sciences literature for many of the topics. Synthesis sources such as UpToDate® and British Medical Journal (BMJ) Clinical Evidence and abstract journals such as Evidence Based Nursing supplemented the initial searches. Searching of other specialty databases may have to be warranted depending on the clinical question.

It bears noting that the database architecture can be exploited to limit the search to articles tagged with the publication type "meta-analysis" in Medline or "systematic review" in CINAHL. Filtering by standard age groups such as "65 and over" is another standard categorical limit for narrowing for relevance. A literature search retrieves the initial citations that begin to provide evidence. Appraisal of the initial literature retrieved may lead the searcher to other cited articles, triggering new ideas for expanding or narrowing the literature search with related descriptors or terms in the article abstract.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Levels of Evidence

Level I: Systematic reviews (integrative/meta-analyses/clinical practice guidelines based on systematic reviews)

Level II: Single experimental study (randomized controlled trials [RCTs])

Level III: Quasi-experimental studies

Level IV: Non-experimental studies

Level V: Care report/program evaluation/narrative literature reviews

Level VI: Opinions of respected authorities/consensus panels

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Adapted from: Melnyck, B. M. & Fineout-Overholt, E. (2005). Evidence-based practice in nursing & health care: A guide to best practice. Philadelphia, PA: Lippincott Williams & Wilkins and Stetler, C.B., Morsi, D., Rucki, S., Broughton, S., Corrigan, B., Fitzgerald, J., et al. (1998). Utilization-focused integrative reviews in a nursing service. Applied Nursing Research, 11(4) 195-206.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Not stated

Evidence Supporting the Recommendations

References Supporting the Recommendations

Agency for Healthcare Research and Quality (AHRQ). Guide to clinical preventive services, 2010-2011: recommendations of the U.S. Preventive Services Task Force [AHRQ Publication No. 10-05145]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2010.

American Heart Association Nutrition Committee, Lichtenstein AH, Appel LJ, Brands M, Carnethon M, Daniels S, Franch HA, Franklin B, Kris-Etherton P, Harris WS, Howard B, Karanja N, Lefevre M, Rudel L, Sacks F, Van Horn L, Winston M, Wylie-Rosett J. Diet and lifestyle recommendations revision 2006: a scientific statement from the American Heart Association Nutrition Committee. Circulation. 2006 Jul 4;114(1):82-96. [97 references] PubMed

Bartlett JG, Dowell SF, Mandell LA, File Jr TM, Musher DM, Fine MJ. Practice guidelines for the management of community-acquired pneumonia in adults. Infectious Diseases Society of America. Clin Infect Dis. 2000 Aug;31(2):347-82. [218 references] PubMed

Beyth RJ, Shorr RI. Principles of drug therapy in older patients: rational drug prescribing. Clin Geriatr Med. 2002 Aug;18(3):577-92. [40 references] PubMed

Centers for Disease Control and Prevention (CDC). Recommendations and guidelines: adult immunization schedule. Atlanta (GA): Centers for Disease Control and Prevention (CDC); 2010.

Chapman IM. The anorexia of aging. Clin Geriatr Med. 2007 Nov;23(4):735-56, v. [89 references] PubMed

Colcombe S, Kramer AF. Fitness effects on the cognitive function of older adults: a meta-analytic study. Psychol Sci. 2003 Mar;14(2):125-30. PubMed

Conn VS, Minor MA, Burks KJ, Rantz MJ, Pomeroy SH. Integrative review of physical activity intervention research with aging adults. J Am Geriatr Soc. 2003 Aug;51(8):1159-68. [30 references] PubMed

Craft S, Cholerton B, Reger M. Cognitive changes with normal and pathological aging. In: Halter JB, Ouslander JG, Tinetti ME, Studenski S, High KP, Asthana S, editor(s). Hazzards geriatric medicine and gerontology. 6th ed. New York (NY): McGraw-Hill; 2009. p. 751-65.

Docherty B. Cardiorespiratory physical assessment for the acutely ill: 1. Br J Nurs. 2002 Jun 13-26;11(11):750-8. [40 references] PubMed

Dunn D. Preventing perioperative complications in an older adult. Nursing. 2004 Nov;34(11):36-41; quiz 42. PubMed

Espiritu JR. Aging-related sleep changes. Clin Geriatr Med. 2008 Feb;24(1):1-14, v. [50 references] PubMed

Hall KE. Aging and neural control of the GI tract. II. Neural control of the aging gut: can an old dog learn new tricks. Am J Physiol Gastrointest Liver Physiol. 2002 Oct;283(4):G827-32. [26 references] PubMed

Hall KE. Effect of aging on gastrointestinal function. In: Halter JB, Ouslander JG, Tinetti ME, Studenski S, High KP, Asthana S, editor(s). Hazzard's geriatric medicine and gerontology. 6th ed. New York: McGraw-Hill; 2009. p. 1059-64.

Henry JD, MacLeod MS, Phillips LH, Crawford JR. A meta-analytic review of prospective memory and aging. Psychol Aging. 2004 Mar;19(1):27-39. [73 references] PubMed

High KP. Infection in the elderly. In: Halter JB, Ouslander JG, Tinetti ME, Studenski S, High KP, Asthana S, editor(s). Hazzard's geriatric medicine and gerontology. 6th ed. New York: McGraw-Hill; 2009. p. 1507-15.

Htwe TH, Mushtaq A, Robinson SB, Rosher RB, Khardori N. Infection in the elderly. Infect Dis Clin North Am. 2007 Sep;21(3):711-43, ix. [168 references] PubMed

Hunt KJ, Walsh BM, Voegeli D, Roberts HC. Inflammation in aging part 1: physiology and immunological mechanisms. Biol Res Nurs. 2010 Jan;11(3):245-52. PubMed

Imperato J, Sanchez LD. Pulmonary emergencies in the elderly. Emerg Med Clin North Am. 2006 May;24(2):317-38, vi. [81 references] PubMed

Joint National Committee. Seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. [internet]. 2004 [accessed 2006 Aug 31].

Kuchel GA. Aging and homeostatic regulation. In: Halter JB, Ouslander JG, Tinetti ME, Studenski S, High KP, Asthana S, editor(s). Hazzard's geriatric medicine and gerontology. 6th ed. New York: McGraw-Hill; 2009. p. 621-9.

Lerma EV. Anatomic and physiologic changes of the aging kidney. Clin Geriatr Med. 2009 Aug;25(3):325-9. [26 references] PubMed

Lu SH, Leasure AR, Dai YT. A systematic review of body temperature variations in older people. J Clin Nurs. 2010 Jan;19(1-2):4-16. [70 references] PubMed

Mahler DA, Fierro-Carrion G, Baird JC. Evaluation of dyspnea in the elderly. Clin Geriatr Med. 2003 Feb;19(1):19-33. [37 references] PubMed

Mattson M. Cellular and neurochemical aspects of the aging human brain. In: Halter JB, Ouslander JG, Tinetti ME, Studenski S, High KP, Asthana S, editor(s). Hazzard's geriatric medicine and gerontology. 6th ed. New York: McGraw-Hill; 2009. p. 739-50.

Mick DJ, Ackerman MH. Critical care nursing for older adults: pathophysiological and functional considerations. Nurs Clin North Am. 2004 Sep;39(3):473-93. [87 references] PubMed

Miller M. Disorders of fluid balance. In: Halter JB, Ouslander JG, Tinetti ME, Studenski S, High KP, Asthana S, editor(s). Hazzard's geriatric medicine and gerontology. 6th ed. New York: McGraw-Hill; 2009. p. 1047-58.

Mukai S, Lipsitz LA. Orthostatic hypotension. Clin Geriatr Med. 2002 May;18(2):253-68. [61 references] PubMed

National Kidney Disease Education Program. Health professionals: GFR MDRD calculators for adults (conventional units). Bethesda (MD): National Kidney Disease Education Program; 2009.

Netz Y, Wu MJ, Becker BJ, Tenenbaum G. Physical activity and psychological well-being in advanced age: a meta-analysis of intervention studies. Psychol Aging. 2005 Jun;20(2):272-84. PubMed

Ney DM, Weiss JM, Kind AJ, Robbins J. Senescent swallowing: impact, strategies, and interventions. Nutr Clin Pract. 2009 Jun-Jul;24(3):395-413. [100 references] PubMed

Park HL, O'Connell JE, Thomson RG. A systematic review of cognitive decline in the general elderly population. Int J Geriatr Psychiatry. 2003 Dec;18(12):1121-34. [63 references] PubMed

Pequignot R, Belmin J, Chauvelier S, Gaubert JY, Konrat C, Duron E, Hanon O. Renal function in older hospital patients is more accurately estimated using the Cockcroft-Gault formula than the modification diet in renal disease formula. J Am Geriatr Soc. 2009 Sep;57(9):1638-43. PubMed

Smith HA, Connolly MJ. Evaluation and treatment of dysphagia following stroke. Top Geriatr Rehabil. 2003;19:43-59.

Stern M. Neurogenic bowel and bladder in the older adult. Clin Geriatr Med. 2006 May;22(2):311-30; ix. [67 references] PubMed

Suhayda R, Walton JC. Preventing and managing dehydration. Medsurg Nurs. 2002 Dec;11(6):267-78; quiz 279. [32 references] PubMed

U.S. Department of Health and Human Services (DHHS), Office of the Surgeon General. Bone health and osteoporosis: a report of the Surgeon General. Rockville (MD): U.S. Department of Health and Human Services (DHHS); 2004.

U.S. Department of Health and Human Services, Office of the Surgeon General. The health consequences of smoking: a report of the Surgeon General. Rockville (MD): U.S. Department of Health and Human Services; 2004.

U.S. Department of Health and Human Services, U.S. Department of Agriculture. Dietary guidelines for Americans, 2005. Washington (DC): U.S. Department of Health and Human Services, U.S. Department of Agriculture; 2005. 84 p.

Visvanathan R, Chapman IM. Undernutrition and anorexia in the older person. Gastroenterol Clin North Am. 2009 Sep;38(3):393-409. [83 references] PubMed

Watters JM. Surgery in the elderly. Can J Surg. 2002 Apr;45(2):104-8. [20 references] PubMed

Zeleznik J. Normative aging of the respiratory system. Clin Geriatr Med. 2003 Feb;19(1):1-18. [67 references] PubMed

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for selected recommendations (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Patient

Successful aging of older adult through appropriate lifestyle practices and health care

Health Care Provider

- Identification of normative changes in aging and differentiation from pathological processes
- Development of interventions to correct for adverse effects associated with aging

Institution

- Development of programs to promote successful aging
- Provision of staff education on age-related changes in health

Potential Harms

Not stated

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Mobile Device Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

End of Life Care

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Smith CM, Cotter V. Age-related changes in health. In: Boltz M, Capezuti E, Fulmer T, Zwicker D, editor(s). Evidence-based geriatric nursing protocols for best practice. 4th ed. New York (NY): Springer Publishing Company; 2012. p. 23-47.

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2008 (revised 2012)

Guideline Developer(s)

Hartford Institute for Geriatric Nursing - Academic Institution

Guideline Developer Comment

The guidelines were developed by a group of nursing experts from across the country as part of the Nurses Improving Care for Health System Elders (NICHE) project, under sponsorship of the Hartford Institute for Geriatric Nursing, New York University College of Nursing.

Source(s) of Funding

Hartford Institute for Geriatric Nursing

Guideline Committee

Not stated

Composition of Group That Authored the Guideline

Primary Authors: Constance M. Smith, PhD, RN Wilmington, DE; Valerie Cotter, DrNP, CRNP, FAANP, Advanced Senior Lecturer, University of Pennsylvania

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Smith CM, Cotter V. Age-related changes in health. In: Capezuti E, Zwicker D, Mezey M, Fulmer T, editor(s). Evidence-based geriatric nursing protocols for best practice. 3rd ed. New York (NY): Springer Publishing Company; 2008. p. 431-58.

Guideline Availability

Electronic copies: Available from the Hartford Institute for Geriatric Nursing Web site.

Copies of the book *Evidence-Based Geriatric Nursing Protocols for Best Practice*, 4th edition: Available from Springer Publishing Company, 536 Broadway, New York, NY 10012; Phone: (212) 431-4370; Fax: (212) 941-7842; Web: www.springerpub.com.

Availability of Companion Documents

The ConsultGeriRN app for mobile devices is available from the Hartford Institute for Geriatric Nursing Web site.

Patient Resources

None available

NGC Status

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